

the 25th, 26th, and 27th, while at the same time an area of low pressure stretched southward over British Columbia and Alberta; on the 28th these two depressions, central respectively at Yuma and Edmonton, appear to have been only parts of a still greater feature in the general circulation of the atmosphere. On the morning of the 29th the southern end of this depression was represented by a "low" in Kan-

sas and the northern end by a "low" in Saskatchewan; this latter is the depression (XI) just alluded to as central in British Columbia on the 27th, whence it passed over into Alberta on the 28th, and was in Saskatchewan on the 29th. On the 30th these were united in a large area whose center was in Nebraska while a new depression was forming in the Gulf of California.

NORTH ATLANTIC STORMS FOR SEPTEMBER, 1893.

[Pressure in inches and millimeters; wind-force by Beaufort scale.]

The paths of storms that passed over the western portion of the north Atlantic Ocean are shown on Chart I, so far as can be traced from information received up to the 25th of October, through the co-operation of the Hydrographic Office and the "New York Herald Weather Service."

The normal pressure for September over the north Atlantic Ocean, as shown by the international simultaneous meteorological observations, is highest, 30.18 (767), in a small oval between parallels N. 33° and N. 39° and meridians W. 22° and W. 38°. The isobar of 30.10 (764) extends from W. 11° to W. 86° and between the parallels N. 23° and N. 43°. Pressure is lowest, 29.70 (754), from N. 58°, W. 25° northward over Iceland, Greenland, and Nova Zembla. As compared with August the normal pressure for September is 0.05 less in the mid-Atlantic over a narrow belt extending from N. 20°, W. 65° to N. 35°, W. 38°.

The tracks of storms for September may be classified as: (I) those that pass from the equatorial Atlantic westward over the West Indies and the Caribbean Sea to the Gulf of Mexico, or at least to Florida, and then recurve toward the northeast, passing over the Atlantic States and Labrador into the north Atlantic region; (II) those that start in the equatorial Atlantic and after passing a short distance northwest recurve to the northeast long before reaching the West Indies or the American coast; these also finally enter the north Atlantic region; (III) those that pass from Bering Sea and the northwest Pacific eastward over the Rocky Mountains and southeastward over the Great Lakes region, thence eastward to the Atlantic Ocean.

The average velocity of movement of storm centers for September, in statute miles per hour, is 26 for the United States when moving westward, and 19 for the Atlantic Ocean. During the process of recurving the West Indian hurricanes move at the rate of only 9 miles per hour. On the average about one storm endures long enough to pass from the North American continent over the Atlantic to Europe.

During September, 1893, the following storms have been traced over portions of the north Atlantic Ocean; the centers are located for Greenwich noon by international simultaneous observations as follows:

A. A low barometer existed northeast of Labrador September 1st, 29.20 being reported at N. 54° and W. 50°, with westerly gales southward to N. 40°. This was undoubtedly the end of the hurricane described in the August Review. It moved slowly eastward, being apparently in W. 40° on the 2d, after which it disappeared from our chart and merged into the general low pressure around Iceland.

B. A low barometer northeast of Labrador on September 5th, with westerly gales to the southward, apparently a continuation of the September low area No. 1. This moved northeast and expanded rapidly into the Icelandic low area, which,

on the 7th, was central to the east of Iceland, while severe northwest gales prevailed between N. 45° and 55°, and W. 45° and 55°. On the 8th the low was central over the north Baltic, whence it moved southeastward into Russia.

C. On the 5th the pressure was diminishing at the Isthmus of Panama, and on the 6th in western Cuba, at which time a hurricane center probably existed in the western portion of the Gulf of Mexico. The track of this hurricane is not satisfactorily shown by the marine reports, but it is undoubtedly the same that passed northeastward along the coast of Louisiana until it entered and crossed that state on the 7th and 8th.

D. On the 9th a storm-center passed over the Gulf of Saint Lawrence, and on the 10th was apparently east of Labrador. No further details can be given as to the center of this area of low pressure until on the 13th, when it was apparently east of Iceland.

E. On the 11th a storm-center was apparently central at N. 43°, W. 54°. On the 12th it was at N. 48°, W. 42°. On the 13th, N. 54°, W. 40°, after which it can not be traced, but by the 15th the isobars of the preceding low over the Baltic had stretched westward as though the present low was about to join that one, and on the 16th pressure was again lowest over the Baltic. On the 17th, and thence until the 22d, low pressure was again lowest over the Baltic. On the 17th, and thence until the 22d, low pressure covered the whole of Europe, sometimes presenting several subsidiary low centers. On the 23d pressure rose in southeastern Europe and the principal low center was over Norway. On the 24th and 25th the pressure continued rising in southeastern and southwestern Europe, continuing lowest over Norway and Sweden. On the 26th and 27th pressure slowly recovered, and the low center disappeared in the presence of a still deeper low advancing from the Atlantic.

F. From the 14th to 17th pressure steadily rose in the mid-Atlantic and eastward to Africa and northward to N. 55°. Apparently the low area was passing eastward on or north of N. 60°, and on the 19th low pressure was central east of Iceland, while northwest gales prevailed north of N. 50° and east of W. 30°. This, combining with the low from which Europe was then recovering, caused the low pressure to continue prevailing over Europe until the 28th, as above mentioned. The center of lowest pressure was generally over Norway and Sweden. On the 27th a single report, 29.46, force 11, at N. 54°, W. 46°, shows that a third low center was advancing southeastward from Baffins Bay. On the 28th this was apparently in W. 20°, and on the 29th was near the coast of Scotland, having grown steadily in the extent of its depression. Pressure again fell throughout Europe, while this depression moved northeastward, and on the 30th was central north of the coast of Scotland.

OCEAN FOG IN SEPTEMBER.

The limits of fog belts west of the 40th meridian, as reported by shipmasters, are shown on Chart I by dotted shad-

ing. Near the Banks of Newfoundland fog was reported on 23 dates; between the 55th and 65th meridians on 14 dates; and west of the 65th meridian on 5 dates. Compared with the corresponding month of the last 5 years the dates of occurrence of fog near the Grand Banks numbered 7 more than the average; between the 55th and 65th meridians, 8 more than the average; and west of the 65th meridian, 3 less than the average.

OCEAN ICE IN SEPTEMBER.

The positions of icebergs and field ice reported for September, 1893, are shown on Chart I by crosses (X).

A reference to the table will show that in the last 11 years there have been but two Septembers (1891 and 1892) for which ice has not been reported south of the 50th parallel, and that the eastern limit of ice for the current month is about 2½° east of the average eastern limit for September.

The following table shows the southern and eastern limits

of the region within which icebergs or field ice were reported for September during the last 11 years:

Southern limit.			Eastern limit.		
Month.	Lat. N.	Long. W.	Month.	Lat. N.	Long. W.
September, 1883.....	48 25	47 10	September, 1883.....	49 01	44 33
September, 1884.....	46 06	53 21	September, 1884.....	47 39	49 14
September, 1885.....	45 40	48 22	September, 1885.....	48 40	46 27
September, 1886.....	46 40	53 00	September, 1886.....	48 00	48 40
September, 1887.....	45 37	40 50	September, 1887.....	45 37	40 50
September, 1888.....	Off Cape Race.		September, 1888.....	53 00	52 08
September, 1889.....	46 21	48 22	September, 1889.....	48 59	46 48
September, 1890.....	45 30	48 00	September, 1890.....	50 30	46 22
September, 1891.....	Straits of Belle Isle		September, 1891.....	53 18	51 20
September, 1892.....	Straits of Belle Isle		September, 1892.....	52 04	54 55
September, 1893.....	44 27	48 29	September, 1893.....	46 50	45 20
Mean.....	46 06	48 27	Mean.....	49 25	47 52

* On the 4th a large lump of ice 100 feet long and 6 feet above water was reported in N. 36° 49', W. 42° 18'; this is the lowest latitude in which ice was ever reported in the north Atlantic Ocean.

TEMPERATURE OF THE AIR (expressed in degrees Fahrenheit).

The distribution of mean temperature over the United States and Canada for September, 1893, is shown by the dotted isotherms on Chart II; the lines are, however, not drawn for the higher irregular surface of the Rocky Mountain plateau; the temperatures have not been reduced to sea level, and the isotherms, therefore, relate to the average surface of the country over which they are drawn; in mountainous regions, such isotherms would be controlled largely by the topography, and it is, therefore, not practicable to present the temperature data in this manner unless a contour map on a large scale is published as a base chart.

In the table of meteorological data from voluntary observers, the actual mean temperature is given for each station, and in the table of climatological data, both the mean temperatures and the departures from the normal are given for the regular stations of the Weather Bureau. In the latter table the stations are grouped by geographical districts, for each of which is given the average temperature and departure from the normal. The normal for any district or station may be found by adding the departures to the current average when the latter is below the normal and by subtracting when it is above.

For regular stations of the Weather Bureau the monthly mean temperature is the simple mean of all daily maxima and minima; for voluntary stations a variety of methods of computation is necessarily allowed, as shown by the notes appended to the tabulated meteorological record.

During September, 1893, the mean temperature was highest at a few stations in the lower Colorado valley, where it was a little above 90. The average temperature was from 80 to 85 in extreme southern Florida, at Key West, in the southern half of Texas, and the lower Colorado valley. The temperature was below 55 on the coast of Washington and below 60 on the greater part of the immediate coast of northern California; it was between 50 and 55 in northern New York and New England, the Canadian Maritime Provinces, northern Lake Huron and Lake Michigan, southern Manitoba, and western Montana.

DEPARTURES FROM NORMAL TEMPERATURE.

As compared with the normal temperature the mean temperature for September was in excess throughout the interior of the country, being 3 or 4 above in Missouri, southern Illinois, eastern Kansas and Nebraska, and 5 in central Texas. The temperature was below the normal on the Pacific coast and western portion of the Rocky Mountain region, being from 4 to 7 in deficit in central California.

The following table shows for certain stations, as reported by voluntary observers, (1) the normal temperature for September for a series of years; (2) the length of record during which the observations have been taken, and from which the normal has been computed; (3) the mean temperature for September, 1893; (4) the departure of the current month from the normal; (5) the extreme monthly mean for September.

State and station.	(1) Normal for the month of Sept.	(2) Length of record.	(3) Mean for Sept., 1893.	(4) Departure from normal.	(5) Extreme monthly means for September.			
					Highest.	Year.	Lowest.	Year.
<i>Arizona.</i>	0	Years	0	0	0		0	
Fort Apache.....	66.2	21	64.6	- 1.6	71.4	1879	61.0	1884
Fort Mohave.....	85.7	21	81.4	- 4.3	90.2	1875	81.4	1893
Whipple Barracks.....	66.4	22	59.9	- 6.5	74.4	1879	59.9	1893
<i>Arkansas.</i>								
Keesees Ferry.....	70.9	12	72.6	+ 1.7	76.4	1884	67.5	1883
<i>California.</i>								
Fort Bidwell.....	62.1	22	.....	.....	65.9	1880	54.0	1884
Riverside.....	72.5	11	65.5	- 7.0	76.8	1883	65.5	1893
<i>Colorado.</i>								
Las Animas.....	65.6	11	64.9	- 0.7	67.6	1892	63.5	1883
<i>Florida.</i>								
Merritts Island.....	79.7	11	81.0	+ 1.3	82.5	1882	78.0	1890
<i>Georgia.</i>								
Forayth.....	76.3	19	77.4	+ 1.1	82.2	1884	72.8	1888
<i>Idaho.</i>								
Boise Barracks.....	61.2	19	59.0	- 2.2	68.0	1888	54.6	1884
Fort Sherman.....	56.4	10	57.8	+ 1.4	58.6	'85, '91, '92	52.9	1881
<i>Indiana.</i>								
Lafayette.....	64.2	10	67.9	+ 3.7	69.7	1891	61.2	1883
<i>Indian Territory.</i>								
Fort Supply.....	69.8	12	72.4	+ 2.6	72.4	1893	66.6	1890
<i>Iowa.</i>								
Cresco.....	58.9	20	60.5	+ 1.6	64.6	1891	54.3	1873
<i>Kansas.</i>								
Eureka Ranch.....	69.7	10	69.0	- 0.7	74.3	1884	67.1	1883
Independence.....	70.1	21	73.2	+ 3.1	74.9	1881	66.2	1889, 1890
Salina.....	70.3	11	.....	.....	77.3	1884	65.1	1890
<i>Louisiana.</i>								
Grand Coteau.....	77.2	10	77.8	+ 0.6	81.6	1884	74.7	1890
<i>Maine.</i>								
Orono.....	57.0	22	52.3	- 4.7	60.8	1891	52.3	1893
<i>Maryland.</i>								
Cumberland.....	62.4	22	64.0	+ 1.6	70.0	1881	59.3	1888
<i>Michigan.</i>								
Kalamazoo.....	62.2	17	63.3	+ 1.1	69.0	1881	55.2	1879
<i>Missouri.</i>								
Sedalia.....	69.8	9	72.2	+ 2.4	75.9	1881	64.6	1890
<i>Montana.</i>								
Fort Custer.....	58.9	14	61.2	+ 2.3	64.8	1892	54.0	1884
<i>Nebraska.</i>								
Fort Robinson.....	61.6	10	62.6	+ 1.0	67.6	1891	56.1	1886
Genoa (near).....	62.9	17	66.8	+ 3.9	67.0	1891	59.9	1883
<i>Nevada.</i>								
Brown.....	69.7	21	.....	.....	75.9	1888	64.6	1881
Carson City.....	60.9	16	54.4	- 6.5	65.1	1888	54.4	1893
<i>New Hampshire.</i>								
Hanover.....	56.0	22	53.0	- 3.0	62.9	1881	53.0	1893